

John F. Kennedy Space Center



“Making Great Strides in Launching ELaNa”

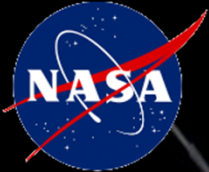
**Small Sat CubeSat Workshop
Logan UT
2014**

Garrett Skrobot

ELaNa Project Manager

Launch Services Program

NASA

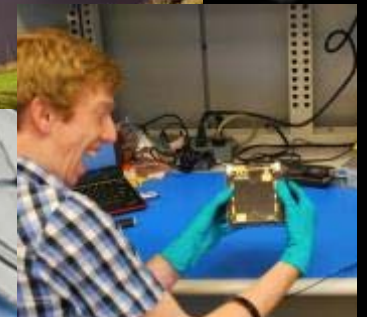
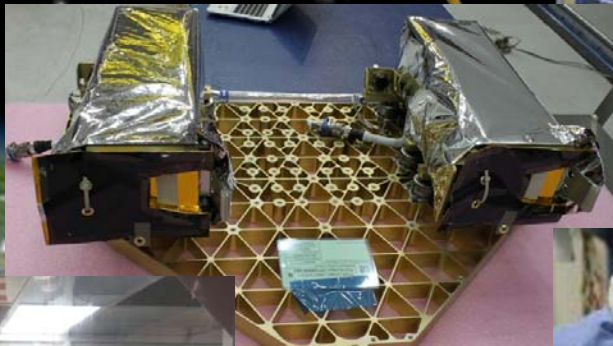


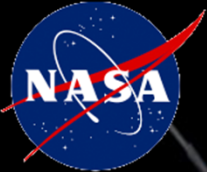
John F. Kennedy Space Center

What has LSP been doing the past 12 months?



“We have been
Manifesting...Integrating...and
Launching... CubeSats”





John F. Kennedy Space Center

ELaNa Launches Aug 2013 – Aug 2014

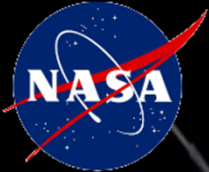


- ELaNa IV – ORS3
(Nov 19, 2013)
- 11 CubeSat
Missions

- ELaNa II – NROL-39
(Dec 5, 2013)
- 4 CubeSat Missions

- ELaNa V – CRS3
(Apr 18, 2014)
- 5 CubeSat
Missions

Partnerships have been key in launching CubeSats



John F. Kennedy Space Center

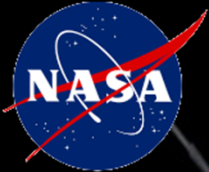
ELaNa IV (Nov 19, 2013)



- KYSat II (Kentucky Space)
- DragonSat -1 (Drexel University)
- Copper-Cube: (St. Louis University)
- TJSat (Thomas Jefferson HS)
- SPA-1 Trailblazer (University of New Mexico)
- PhoneSat (AMES)
- ChargerSat – 1 (UAH)
- Lunar Orbiter/Lander CubeSat (Vermont Technical College)
- Swamp Sat (University of Florida)
- CAPE-2 (The University of Louisiana at Lafayette)
- UNP-6 (University of Hawaii)



Sensitive But Unclassified



John F. Kennedy Space Center

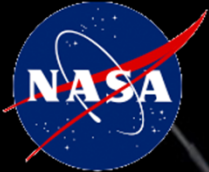
ELaNa II (Dec 5, 2013)



- CUNYSAT-1 (Medgar Evers College, City University of New York)
- IPEX: Intelligent Payload Experiment (JPL)
- Mcubed II (University of Michigan / JPL)
- FIREBIRD (Montana State University)



Sensitive But Unclassified



John F. Kennedy Space Center

ELaNa V (Apr 18, 2014)



- All-Star/THEIA (Colorado)
- PhoneSat (AMES)
- TSAT (Taylor University)
- KickSat: (Cornell University)
- SporeSat (AMES)



Sensitive But Unclassified



John F. Kennedy Space Center

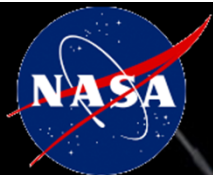
Launches next 12 months



NASA CubeSat Missions scheduled for launched over the next 12 months since August 2014

- ELaNa X (Nov 5, 2014)
 - » 3 CubeSat Missions
- ELaNa VII (NET Nov, 2014)
 - » 2 CubeSat Missions
- ELaNa VIII (Oct, 2014) - ISS
 - » 1 CubeSat Missions
- ELaNa IX (Apr, 2015) - ISS
 - » 3 CubeSat Missions
- ELaNa XI (NET May, 2015)
 - » 2 CubeSat Missions
- ELaNa XII (NET Aug, 2015)
 - » 4 CubeSat Missions






















John F. Kennedy Space Center

ELaNa Missions Manifest



ELaNa Missions Manifest

						FY 2016	FY 2017	
	 ELaNa I March 4, 2011 Glory – Taurus 3 CubeSats	 ELaNa III Oct 28, 2011 NPR – DII 5 CubeSats		 ELaNa V Apr 18, 2014 CRS#3 – F9 5 CubeSats	 ELaNa VI Sept 13, 2012 NROL-36 – DII 4 CubeSats	 ELaNa Aug, 2016 GO Launcher 3 Carriers	 ELaNa NLT 2 nd Q 2017 JPSS-1 – DII 3 Carriers	 ELaNa 1 st Q 2017 ICESat II – DII 3 Carriers
			 ELaNa VI Sept 13, 2012 NROL-36 – DII 4 CubeSats	 ELaNa II Dec 5, 2013 NROL-39 – AV 4 CubeSats	 ELaNa XI NET May 2014 AFSPC-5 4 CubeSats			
				 ELaNa IV NET 11/19/13 ORS-3 11 CubeSats	 ELaNa VII Oct 2014 4 CubeSats			
Commercial					 ELaNa Dec 2015 4 CubeSats		 ELaNa Dec 2017 4 CubeSats	

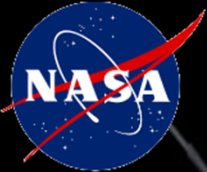


Manifested



In Work

Launched	Manifested	Un-Assigned
32	16	53



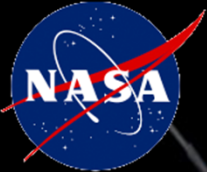
John F. Kennedy Space Center

CubeSat IDIQ



- **The current services contract with CalPoly for new awards will expire in Dec 2014**
 - All task are to be completed by December 2015
- **Five new contractors have been selected to provide hardware and services for NASA CubeSat Launches**
 - **Five Year contracting period worth a total of \$9.5 Million**
 - » 406 Aerospace LLC of Bozeman, Montana
 - » Applied Technology Associations of Albuquerque, New Mexico
 - » Spaceflight Inc. of Tukwila, Washington
 - » TriSept Corp. of Chantilly, Virginia
 - » Tyvak Nano-Satellite Systems LLC of Irvine, California

Sensitive But Unclassified



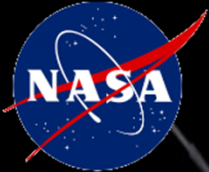
John F. Kennedy Space Center

CSLI Call #6



- **The Opportunity of Announcement to be released in August for the selection of CubeSat for potential launches in 2016 - 2018**

Sensitive But Unclassified



John F. Kennedy Space Center

Missions and Systems



ELaNa I	ELaNa II&VI	ELaNa III & X	ELaNa IV	ELaNa V	ELaNa VII	ELaNa VIII & IX
Taurus (Minotaur C)	Atlas V NRO Developed	Delta II	Minotaur I ORS Developed	Falcon 9 (Aft End)	Super Strypi ORS Developed	ISS
Third Stage One 3U Carrier	ABC/CulLite Eight 3U Carriers	Second Stage Three 3U Carriers	NASA Ames dispenser Eight 3U Carriers	Aft End Surf Board Six 3U Carriers	NASA Ames dispenser Eight 3U Carriers	NanoRacks





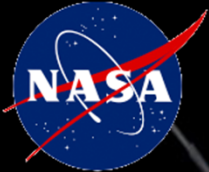
John F. Kennedy Space Center

Missions and Systems



- Not only are CubeSats launching on rockets, they are now being deployed off of the ISS
- LSP is taking advantage of these opportunities to place CSLI CubeSats on Orbit
- Also a Nano-Launcher System is in work for the dedicated launch of CubeSats
 - Sept 2013 a GO launcher launch vehicle was placed on contract to launch three 3U CubeSats in late 2016





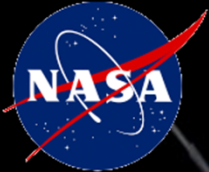
John F. Kennedy Space Center

Light Weight CubeSat Deployer



- Rail Pod developed by Tyvak under a NASA contract to reduce the mass of the deployer system
- Reducing the mass of a standard PPOD from 3.0Kg to 1.25Kg for the Rail POD
 - This is valuable when launched on a Nano-Launcher system with limited performance
- System has been qual'd to NASA GEVS levels
- Working to secure first flight in 2015



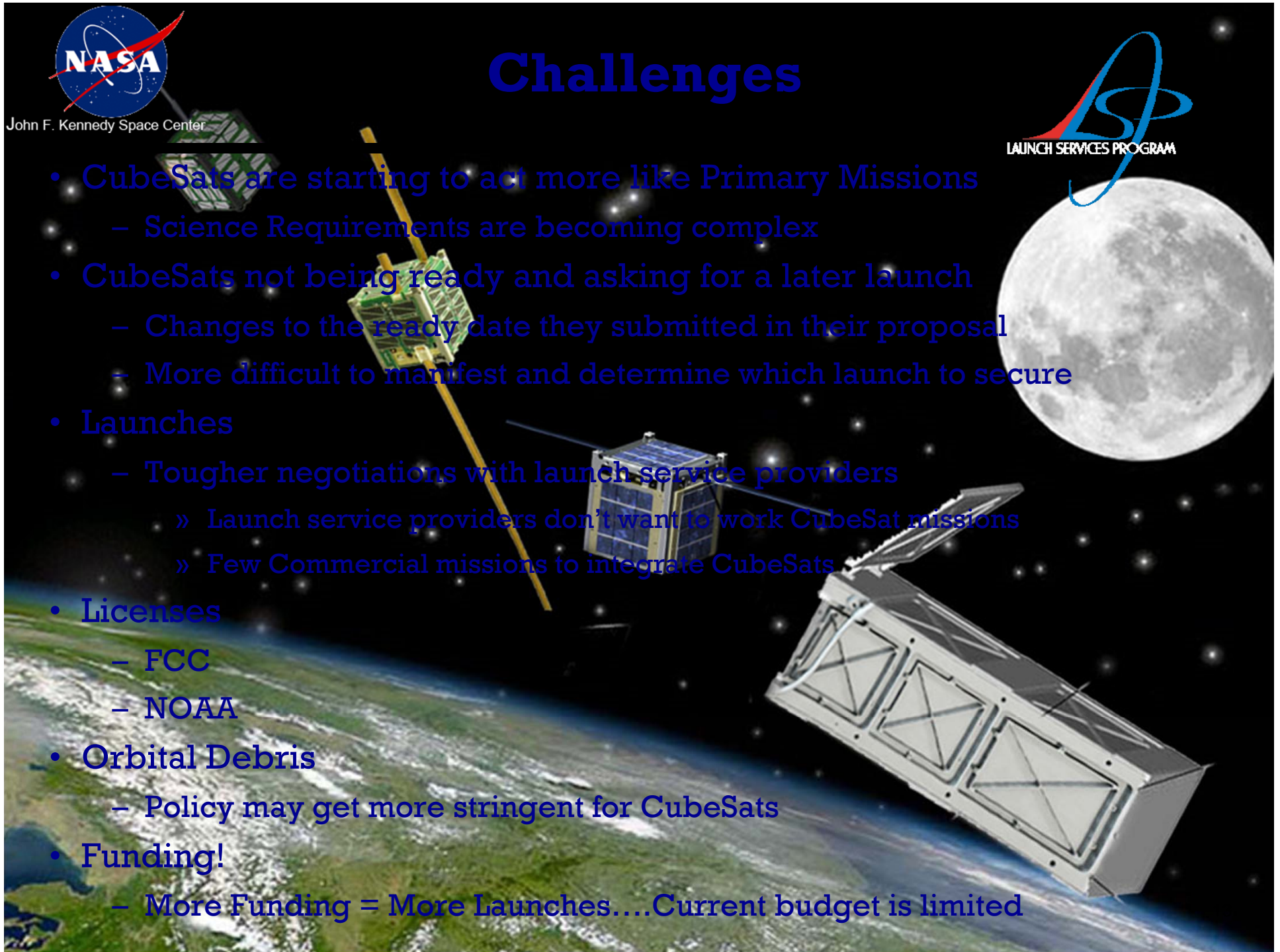


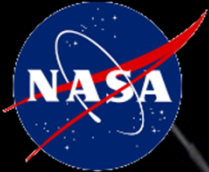
John F. Kennedy Space Center

Challenges



- CubeSats are starting to act more like Primary Missions
 - Science Requirements are becoming complex
- CubeSats not being ready and asking for a later launch
 - Changes to the ready date they submitted in their proposal
 - More difficult to manifest and determine which launch to secure
- Launches
 - Tougher negotiations with launch service providers
 - » Launch service providers don't want to work CubeSat missions
 - » Few Commercial missions to integrate CubeSats
- Licenses
 - FCC
 - NOAA
- Orbital Debris
 - Policy may get more stringent for CubeSats
- Funding!
 - More Funding = More Launches....Current budget is limited





John F. Kennedy Space Center

Summary



- Launched 32 CubeSats to date as ELaNa missions
- Plans for 6 ELaNa missions over the next 12 months
- CSLI
- Five new contractors will provide hardware and integration services
- Nano-Launcher system on contract for the sole purpose of launching CubeSats
- Development of a light weight CubeSat Deployer system that can be used on small launch vehicle
- Challenges



John F. Kennedy Space Center



Questions

